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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/887,910      | 06/22/2001  | Jack Hwang           | 42390P10625         | 7448             |

7590

02/28/2003

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EXAMINER

ANYA, IGWE U


ART UNIT

PAPER NUMBER

2825

DATE MAILED: 02/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                               |                              |  |
|------------------------------|-------------------------------|------------------------------|--|
| <b>Office Action Summary</b> | Application No.<br>09/887,910 | Applicant(s)<br>HWANG ET AL. |  |
|                              | Examiner<br>Igwe U. Anya      | Art Unit<br>2825             |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 June 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
     1. ☐ Certified copies of the priority documents have been received.  
     2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
     3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1 –12, 14, 15, and 20 to 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goeckner et al. (US Patent 6335536) in view of Aronowitz et al. (US Patent 6087229).

4. Goeckner et al. teach a method and apparatus for low voltage nitrogen plasma doping of a semiconductor substrate using dual voltage pulses, comprising:

a plasma-generating voltage spacing less than 1 second interval of at least 1KV and an implantation voltage, the plasma being generated in the chamber between the anode and the substrate (col. 4 lines 10 – 65);

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implantation voltage of 88 volts or lower (col. 6 lines 14 27);

plasma-generating voltage and implant voltage ratio of 10:1 or greater (col. 5 line 30 – col. 6 line 3);

the period of the plasma-generating voltage and the implant voltage being the same (col. 6 line 55 – col. 7 line 30);

a choice dependent reference voltage (col. 5 lines 40 – 55).

5. Aronowitz et al. each a method for pulsed low voltage nitrogen plasma doping of a semiconductor substrate, comprising:

forming a conductive transistor gate on a dielectric layer implanted with ions (col. 8 lines 17 – 51);

implantation voltage of greater than 10 volts but less than 20 volts (col. 5 line 57 – col. 6 line 22); and

the implanted ions increase the dielectric constant of the gate dielectric (col. 5 lines 16 – 32).

6. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Aronowitz et al. with the Goeckner et al. reference to form a transistor having pulsed doped gate dielectric having uniform doping.

7. Claims 13, and 16 through 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goeckner et al. (US Patent 6335536) in view of Aronowitz et al. (US Patent 6087229) and further in view of Chen (US Patent 6432780).

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8. The Goeckner/Aronowitz et al. reference teaches the features previously outlined but lacks the step of:

forming the plasma-generating voltage by application of a positive maximum to the cathode, and the implantation voltage potential by application of a negative maximum to the substrate.

However, Chen teaches a step comprising a plasma-generating voltage formed by application of a positive maximum to the cathode, and implantation voltage potential formed by application of a negative maximum to the substrate (col. 3 lines 6 – 20).

9. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Chen into the Goeckner/Aronowitz et al. reference as art recognized equivalent. Furthermore, provision for adjustability where needed involves only routine skill in the art. In re Stevens, 101 USPQ 284 (CCPA).

10. Prior art considered but not used in the rejection include Ono et al. (US Patent 6184110), and Chen (US Pub. 2002/0132457).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Igwe U. Anya whose telephone number is (703) 308-3549. The examiner can normally be reached on M - F 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (703) 308-1323. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

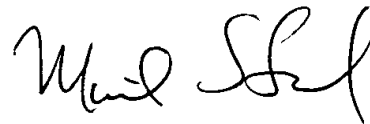
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872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Igwe U. Anya  
Examiner  
Art Unit 2825

IA  
February 21, 2003

A handwritten signature in black ink, appearing to read "Matthew Smith", written in a cursive style.

MATTHEW SMITH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800